We claim:

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1. An accustic transducer comprising:

- a substrate having a topside and a backside;
- a microfabricated acoustic transducer formed on the topside of the substrate; and
- a damping material disposed on the backside of the substrate, the damping
- 5 material suppressing substrate acoustic modes.
- 1 2. An apparatus according to claim 1 wherein the damping material has an acoustic
- 2 impedance that is similar to the acoustic impedance of the substrate and is lossy.
- 1 3 An apparatus according to claim 1 further including electronic circuits formed in 2 the substrate.
 - 4. An apparatus according to claim 3 wherein the electronics circuits are in between the sensor and the damping material.
 - 5. An apparatus according to claim 1 wherein the substrate is a wafer.
 - 6. An apparatus according to claim 1 wherein the damping material suppresses a longitudinal ringing mode.
 - 7. An apparatus according to claim wherein the damping material suppresses a lamb wave ringing mode.
 - 8. An apparatus according to claim 1 wherein the microfabricated acoustic transducer operates at frequencies above 20 kHz.
 - 9. An acoustic transducer comprising:
 - a substrate having a topside and a backside, the substrate having a thickness such
 - 3 that resonant modes of the substrate are outside a frequency band of interest; and
 - 4 a microfabricated acoustic transducer formed on the topside of the substrate.

1	10.	An apparatus according to claim 9 further including:	
2		a damping material disposed on the backside of the substrate, the damping	
3	material suppressing substrate acoustic modes.		
1	11.	An apparatus according to claim 10 wherein the damping material suppresses	
2	lamb wave me	odes.	
1	12.	An apparatus according to claim 10 wherein the damping material has an acoustic	
2	impedance tha	at is similar to the acoustic impedance of the substrate and is lossy.	
1	13.	An apparatus according to claim 12 further including electronic circuits formed in	
2	the substrate.		
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¥2 1	14.	An apparatus according to claim 13 wherein the electronics circuits are in	
≒₫2 ►≟	between the sensor and the damping material.		
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1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	15.	An apparatus according to claim 9 further including electronic circuits formed in	
<u>1</u> 2	the substrate.		
	16.	An apparatus according to claim 9 wherein the substrate is a wafer.	
	10.	All apparatus according to claim 9 wherein the substrate is a water.	
<u>[</u>]	17.	An apparatus according to claim 9 wherein the microfabricated acoustic	
2	transducer operates at frequencies above 20 kHz.		
1	18.	An apparatus according to claim 9 wherein the damping material suppresses	
2	stonely wave		
2	Stollely wave	modes.	
1	19.	A method for suppressing acoustic modes, the method comprising:	
2		providing a substrate having a topside and a backside;	
3		forming a microfabricated acoustic transducer on the topside of the substrate; and	
4		placing a damping material on the backside of the substrate, the damping material	
5	suppressing s	ubstrate acoustic modes.	
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1	20.	The method of claim 19 wherein the damping material has an acoustic impedance	
2	that is similar	to the acoustic impedance of the substrate and is lossy.	
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1	21.	The method of claim 20 further comprising forming electronic circuits in the	
2	substrate.		
1	22.	The method of claim 21 wherein the electronics circuits are in between the sensor	
2	and the dampi	e damping material.	
1	23.	The method of claim 19 wherein the substrate is a wafer.	
1	24.	The method of claim 19 wherein the damping material suppresses a longitudinal	
CJ 2	ringing mode.		
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1 1	25.	The method of claim 19 wherein the damping material suppresses a lamb wave	
1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ringing mode.		
	26.	The method of claim 19 further comprising operating the microfabricated acoustic	
<u>*</u> 2	transducer at f	requencies above 20 kHz.	
1 2 2			
<u>.</u> 1	27.	A method for suppressing acoustic modes, the method comprising:	
[] 날 2		providing a substrate having a topside and a backside, the substrate having a	
3	thickness such	that resonant modes of the substrate are outside a frequency band of interest; and	
· 4		forming a microfabricated acoustic transducer on the topside of the substrate.	
1	28.	An apparatus according to claim 27 further including:	
2		a damping material disposed on the backside of the substrate, the damping	
3	material suppr	ressing substrate acoustic modes.	
1	29.	The method of claim 28 wherein the damping material suppresses lamb wave	
2	modes.	The medica of claim 20 wherein the damping material suppresses lame wave	
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1	30.	The method of claim 28 wherein the damping material has an acoustic impedance
2	that is similar	to the acoustic impedance of the substrate and is lossy.
1	31.	The method of claim 30 further comprising forming electronic circuits in the
2	substrate.	
1	32.	The method of claim 31 wherein the electronics circuits are in between the sensor
2	and the damp	ing material.
1	33.	The method of claim 27 further comprising forming electronic circuits in the
2	substrate.	
ding that the true	34.	The method of claim 27 wherein the substrate is a wafer.
1 1	35.	The method of claim 27 further comprising operating the microfabricated acoustic
1 2 1 3	transducer at frequencies above 20 kHz.	
1	36.	The method of claim 27 wherein the damping material suppresses stonely wave
2	modes.	